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ABSTRACT

A survey was conducted on nonimmigrant students from developing countries who were enrolled in postsecondary education in the United States during the 1977-78 academic year and on U.S. faculty who taught in the less developed regions or who collaborated in research or consulted with faculty from these regions. Usable questionnaire data were received from 179 of the 236 surveyed institutions that are members of the Higher Education Panel. Information was obtained on the numbers of nonimmigrant students studying in the fields of science and engineering, health, and business and management at the undergraduate, postbaccalaureate, and postdoctoral levels, and on the numbers of these students who received some direct U.S. financial support. The weighted results of the survey showed that over 76,000 nonimmigrants from developing countries were enrolled either full-time or part-time in the three fields. Approximately 56,000 (74 percent of the total) were enrolled in science and engineering fields, 13,300 (17 percent) were in business and management, and 6,500 (9 percent) were in health fields. The majority of these foreign students (52 percent) were enrolled at the graduate level in almost 200 institutions, 45 percent were undergraduates, and 3 percent had postdoctoral appointments. U.S. support was more common at the more advanced levels of study. Comparisons of the study findings are made with a report issued by the Institute of International Education. Differences between public and private institutions and between large and small institutions are reported, and faculty activities in developing countries are covered. The survey instrument is appended. (SW)

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Scientific and Technical Cooperation with Developing Countries, 1977-78

Frank J. Atelsek and Irene L. Gomberg

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Highlights

Foreign Students

- During 1977-78, doctorate-granting institutions in the United States enrolled more than 76,000 nonimmigrant foreign students from developing countries who were studying science, engineering, health, business or management fields.
- Of these students, 56,500 (74 percent) were in science and engineering, 13,300 (17 percent) were in business and management, and 6,500 (9 percent) were in health fields.
- Over half (52 percent) of these foreign students were postbaccalaureate students, 45 percent were undergraduates, and 3 percent had postdoctoral appointments.
- Nine percent of the undergraduates, 32 percent of the postbaccalaureates, and 64 percent of the postdoctorates obtained some direct financial support from U.S. sources, with those in science and engineering most likely to receive such support.
- One percent of the undergraduates, 6 percent of the postbaccalaureates, and 15 percent of the postdoctorates had U.S. financial support which came primarily from the federal government.

Faculty Activities

- Nearly 3,800 faculty members from U.S. doctorate-granting institutions participated in cooperative scientific and technical activities with developing countries during 1977-78.
- Of this group, 45 percent collaborated in research with faculty members or other researchers from developing countries, 32 percent were active in consultation or other cooperative activities, and 23 percent taught abroad in developing countries.
- Approximately seven of ten participating faculty members were in science and engineering fields, one-fifth were in health fields, and 8 percent were in business and management fields.

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We are grateful to Charles Dickens and Felix Lindsay of the National Science Foundation for their assistance in designing the survey and reviewing this report. We also appreciate the continued guidance of the HEP Advisory Committee, the Federal Advisory Board and its Technical Advisory Committee.

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Background

The topic of this survey report was initially explored in an earlier survey, the results of which were published in International Scientific Activities at Selected Institutions, 1975-76 and 1976-77, HEP Report No. 34 (January 1978). The earlier study focused on scientific and engineering activities at U.S. doctorate-granting institutions and medical schools that involved interchange with other countries in eight major world regions. The present study sought data on non-immigrant students from developing countries who were enrolled in postsecondary education in the United States during the 1977-78 academic year and on U.S. faculty who taught in the less developed regions or who collaborated in research or consulted with faculty from these regions.

This survey was requested by the National Science Foundation in cooperation with the U.S. Department of State. The results are being used in preparing the United States Paper for the 1979 United Nations Conference on Science and Technology for Development. They should also be helpful to people in government and elsewhere who are involved in supporting university-based international science and technology activities and to the administrators and faculty members engaged in such programs.

Methods Summary

The Higher Education Panel is an ongoing survey research program created in 1971 by the American Council on Education. Its purpose is to conduct limited surveys on topics of current policy interest to the higher education community and to government agencies.

The Panel is a stratified sample of 760 colleges and universities broadly representative of the more than 3,000 institutions listed in the National Center for Education Statistics' Education Directory. All institutions in this population are grouped in terms of the variables constituting the Panel's stratification design, based primarily on type (university, four-year college, two-year college), control (public, private), and size (full-time-equivalent enrollment). For any given survey either the entire Panel or an appropriate subset is used.

The survey instrument (see Appendix A) was mailed at the end of December 1977 to the 236 doctorate-granting institutions that are members of the Panel. By the close of the field phase in mid-February 1978, and after intensive follow-up efforts, usable data had been received from 179, or 76 percent, of the institutions surveyed.

The Panel's normal stratification design was modified to fit the requirements of the survey. Eight strata were defined, based on control, type, and size. See Appendix B for the revised stratification design.

National estimates for all doctorate-granting institutions were derived through weighting procedures, using the ratio within each stratification cell between the number of institutions in the population and the number of institutions in the responding sample. Weights were computed separately for each item to allow for differential response. Appendix C compares respondents and nonrespondents.

The tables following the text display the data by control and size of institution.

Findings

For the purposes of this survey, the term developing countries encompasses the countries in five regions of the world: Latin America and the Caribbean, the Far East (excluding Japan), South Asia, Black Africa, and the Near and Middle East and North Africa. An illustrative list of countries included in each of these regions appears on the last page of the questionnaire (Appendix A).

Three groups of major fields were selected for coverage: science and engineering, health, and business and management. The questionnaire asked for information on the numbers of nonimmigrant students (i.e., on temporary visas) currently studying in these fields at the undergraduate, postbaccalaureate, and postdoctoral levels, and on the numbers of these students who received some direct U.S. financial support. (Throughout this report, "graduate student" is used as synonymous with "postbaccalaureate student"; and for convenience, postdoctorals are included with "students.")

Students from Developing Countries

The weighted results of the survey show that, during the 1977-78 academic year, over 76,000 nonimmigrants from developing countries were enrolled either full- or

part-time in the three selected groups of major fields at the doctorate-granting institutions (Table 1). Approximately 56,500 (74 percent of the total) were enrolled in science and engineering fields, 13,300 (17 percent) were in business and management, and 6,500 (9 percent) were in health fields.

The majority of these foreign students (52 percent) were enrolled at the graduate level in almost 200 institutions, 45 percent were undergraduates, and 3 percent had postdoctoral appointments. Table A below shows how students at different levels were distributed among the fields. At each level, at least seven of ten were enrolled in science or engineering programs. The health field, which generally had the fewest students, accounted for one-fourth of the postdoctoral appointments.

Table A

Proportionate Distribution of Nonimmigrant Students from Developing Countries by Selected Field and Level of Study

Level	Total in Scientific, Technical, and Management Fields		Science and Engineering	Health	Business and Management
	Number	Percent			
Undergraduate	34,200	100	72%	9%	19%
Postbaccalaureate	39,900	100	76	7	17
Postdoctoral	2,200	100	70	25	5
Total	76,200[a]	100	74	9	17

[a]Because of weighting and rounding, items do not add to the total.

At the undergraduate level relatively few foreign students--fewer than one in ten of the more than 34,000 such students--received any direct financial support from a United States source.[1] U.S. support was more common, however, at the more advanced levels of study: Almost one-third of the graduate students (32 percent) and almost

[1]Direct U.S. support encompassed any financial support (grant, loan, scholarship, earnings from employment) from the academic institution or from any other known U.S. source, including private foundations and federal, state, and local governments. Since tuition and fees do not cover the entire cost of education, all students receive, in addition to any direct support, an indirect subsidy from government sources, private sources, or endowment income.

two-thirds of those with postdoctoral appointments (64 percent) received some direct financial support from U.S. sources. Science and engineering students were more likely than were other students to receive such support: 26 percent of those in science and engineering had some direct U.S. support, compared with only 16 percent of those in health fields and 13 percent of those in business and management.

Table B

Proportions of Nonimmigrant Students from Developing Countries Receiving Some Direct U.S. Support

Level	Total in Scientific, Technical, and Management Fields	Science and Engineering	Health	Business and Management
Undergraduate	9%	10%	7%	9%
Postbaccalaureate	32	36	18	16
Postdoctoral	64	71	55	16
Total	23	26	16	13

As Table B shows, in science and engineering, 71 percent of the postdoctorals and 36 percent of the graduate students received direct U.S. support. In the health fields, 55 percent of the postdoctorates and 18 percent of the graduate students received such support. Postbaccalaureate foreign students in business and management were least likely to get direct support from U.S. sources (16 percent at both the graduate and the postdoctoral levels).

The proportions of these foreign students whose direct U.S. support came *primarily* from the federal government followed roughly the same pattern (Table C). Few of the undergraduates received such support (1 percent in each field). At the advanced levels, students in science and engineering most often had significant federal assistance (7 percent of postbaccalaureates and 18 percent of postdoctorals). In contrast, those in business and management least frequently received U.S. support that was primarily federal (1 percent of postdoctorals and 2 percent of graduate students).

Table C

Proportion of Nonimmigrant Students from Developing Countries Whose Direct U.S. Support Came Primarily from the Federal Government

Level	Total in Scientific, Technical, and Management Fields	Science and Engineering	Health	Business and Management
Undergraduate	1%	1%	1%	1%
Postbaccalaureate	6	7	3	2
Postdoctoral	15	18	8	1
Total	4	5	3	2

Comparisons with Related Data

According to a recent report issued by the Institute of International Education (IIE), about 203,000 nonimmigrant foreign students were enrolled in U.S. academic institutions during 1976-77, representing an increase of 13 percent over the previous year.[2] About 163,000 (80 percent) of these students came from developing countries.

The IIE data differ in several respects from the weighted results reported here. The IIE information dealt with all foreign undergraduate and graduate students at all colleges and universities in 1975-76 and 1976-77, whereas the HEP survey covered postdoctorals as well but was limited to students from developing countries who were enrolled only in scientific, technical, and management fields at only doctorate-granting institutions in 1977-78. Nonetheless, since the IIE data can be disaggregated by continent, by field, and by level of study, they are comparable enough to the HEP data to provide a reasonable reference point.

As shown in Figure 1, Open Doors reported about 116,000 scientific, technical and management students from developing countries enrolled in all colleges and universities in the United States during 1975-76. Less than half were graduate students

[2] Joint Task Force on Data Collection, Open Doors, 1975-76--1976-77 (New York: Institute of International Education, 1978).

and 53 percent were undergraduates. Nearly three-fourths were studying science or engineering, and more than one-fifth were in business and management. According to the weighted results of the HEP survey, in 1977-78 approximately 74,000 scientific, technical or management students from developing countries were enrolled in Ph.D.-granting institutions alone (Figure 2). More than half were graduate students, and, again, about three-fourths were studying scientific or engineering fields.

Figure 1

Scientific, Technical, and Management Students from Developing Countries, 1975–76: All Institutions (Source: Open Doors, 1978)

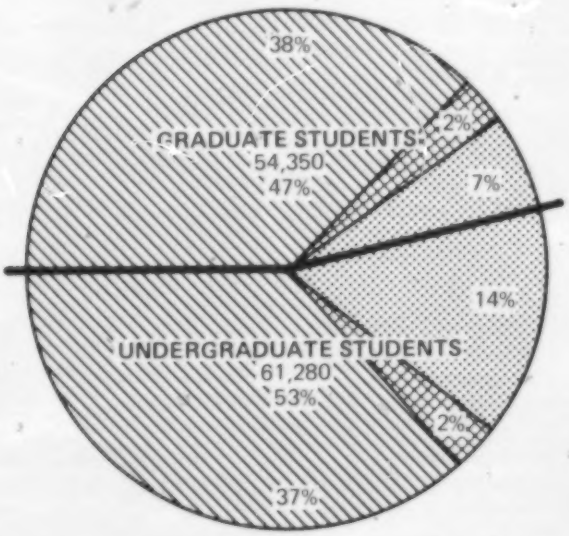
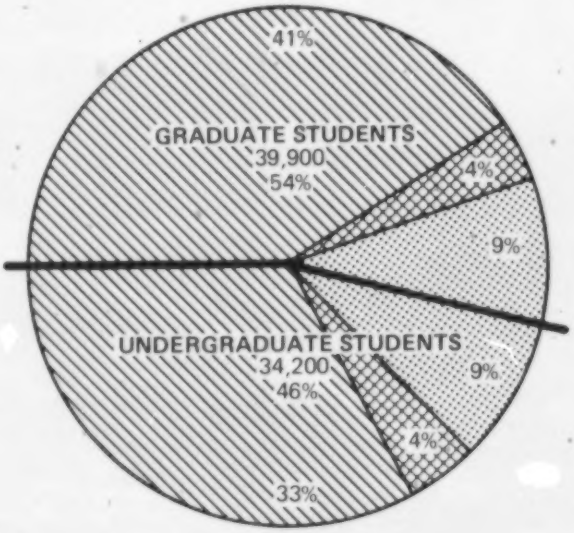


Figure 2

Scientific, Technical, and Management Students from Developing Countries, 1977–78: Ph.D.-Granting Institutions (Source: Higher Education Panel)



Faculty Activities in Developing Countries

The present survey also inquired into three types of cooperative activities which were carried out between U.S. faculty members and developing countries during 1977-78 and which received some financial support from U.S. sources. The three types were: (1) teaching abroad in developing countries, (2) collaboration in research with faculty members or researchers from developing countries, and (3) consultation and other

cooperation with peers from developing countries (e.g., curriculum development, preparation of joint scientific papers). U.S. faculty who were supported wholly by a foreign source were not included.

The weighted responses indicate that almost 3,800 faculty members at 155 of this nation's doctorate-granting institutions participated in some form of cooperation with the developing countries in various scientific and technical fields (Table 2). Forty-five percent of these faculty participants collaborated in research, nearly one-third served in consulting or related roles, and 23 percent went abroad to teach.[3] Business faculty were about equally involved in the three activities: about one-third in each. Faculty in the health fields were least likely to teach abroad (16 percent) and most likely to engage in consulting activities (37 percent).

Among the three selected field groupings, faculty from the science and engineering fields were dominant in each activity, accounting for approximately three-fourths of those who taught abroad or who collaborated in research, and for over two-thirds of those who engaged in consultation and related activities (Table D). Faculty from the health fields accounted for one-fifth of the participants in these activities, and business and management faculty made up the remaining 8 percent of the participants.

Table D

Proportionate Distribution of Faculty Members Involved in U.S.-Supported Cooperative Activities with Developing Countries

Type of Faculty Activity	Total in Scientific, Technical, and Management Fields	Science and Engineering	Health	Business and Management
Teaching abroad	100% (N=900)	75%	14%	11%
Collaborating in research	100 (N=1,700)	73	21	6
Consultation and related activities	100 (N=1,200)	69	23	8
Total	100 (N=3,800)	72	20	8

[3] To avoid duplication, faculty members who participated in more than one activity were counted only in their primary cooperative activity.

Differences Between Public and Private Institutions

Public institutions, which represented 56 percent of all institutions in the survey population, enrolled almost 47,000 (61 percent) of the nonimmigrant students from developing countries (Tables 3 and 4). Nearly twice as many science and engineering students attended public institutions than attended private institutions (37,000 compared with 19,000), whereas more students in the health fields were enrolled at private institutions than public (59 percent of nonimmigrant students in health fields) (Table E). On the other hand, business students were evenly distributed by public and private institutions.

Table E

Proportionate Distribution of Nonimmigrant Students from Developing Countries, by Control of Institution

Control	Total in Scientific, Technical, and Management Fields	Science and Engineering	Health	Business and Management
Public	61%	66%	41%	51%
Private	39	34	59	49
Total	100	100	100	100

Further, there were some differences with respect to direct U.S. support. Among students in each of the three levels in the health fields, those enrolled at public institutions were more likely to receive direct financial support than were their counterparts enrolled at private institutions: 27 percent of all health students at public institutions, compared with 8 percent at private, received direct support.

Faculty activities also differed by institutional control. More than three-fourths of the 3,800 faculty members involved in cooperative activities with developing countries were from 85 public institutions (Tables 5 and 6). Moreover, at public institutions, 78 percent of all faculty participants in such activities came from science and engineering fields, compared with 56 percent of faculty participants at private institutions. On the other hand, faculty from the health fields accounted for a larger proportion of participants from private institutions (37 percent) than from public institutions (14 percent).

Differences Between Large and Small Institutions

To assess the relative involvement of large and of small institutions with developing countries, the 144 institutions ranking in the top half on total enrollment were compared with the 144 institutions ranking in the lower half. Large institutions were defined as those having a total enrollment greater than 9,455 students in 1976-77, and small institutions were those having fewer than 9,455 students. The large institutions accounted for 85 percent of the total student enrollment at doctorate-granting institutions in the 1976-77 academic year.

Large institutions as a group were more apt to enroll nonimmigrant students from developing countries than were small institutions, as Table F indicates.

Table F

Proportion of Institutions Reporting Presence of Nonimmigrant Students from Developing Countries

Level	Large Institutions	Small Institutions
Undergraduate	77%	51%
Postbaccalaureate	75	60
Postdoctoral	40	29

The larger institutions accounted for 78 percent of all nonimmigrant foreign students from developing countries enrolled in the three major field groups covered by the survey (Tables 7 and 8). Proportionately more of the foreign students at the larger institutions were at the postbaccalaureate level (55 percent), whereas a greater proportion of those at the smaller institutions were undergraduates (52 percent). The direction of these differences held for each of the three major fields surveyed.

In terms of financial support, however, science and engineering students at smaller institutions were more likely to receive direct support from U.S. sources than were their counterparts at larger institutions. The opposite was true for students enrolled in the health fields: Of those studying at the postbaccalaureate and

doctoral levels, a much greater proportion at the larger institutions obtained direct U.S. support.

Faculty participation also varied by institutional size. The larger institutions were more likely than the smaller institutions to report all three types of faculty activity, as Table G shows.

Table G

Proportion of Institutions Reporting Faculty Involvement with Developing Countries

Type of Faculty Activity	Large Institutions	Small Institutions
Teaching abroad	43%	15%
Collaboration in research	51	25
Consultation and related activities	49	26

Not surprisingly, faculty members from the larger institutions who engaged in activities involving developing countries outnumbered their counterparts from the smaller institutions by almost four to one (3,005 versus 780) (Tables 9 and 10). Most faculty participants came from science and engineering fields, which accounted for 76 percent of those from the large institutions and 60 percent of those from the small institutions.

Table 1

Estimates of Foreign Students and Postdoctorals from Developing Countries, 1977-78, by Selected Fields: All Ph.D.-Granting Institutions (N=288)

Students and Postdoctorals	Number of Participating Institutions[a]	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Number of undergraduates (majors)	184	34,170	24,716	2,994	6,460
Percent with some direct U.S. support		9.3	9.8	6.5	8.7
Percent with support primarily from the federal government		1.2	1.2	1.2	1.1
Number of postbaccalaureates	195	39,876	30,248	2,925	6,703
Percent with some direct U.S. support		31.6	36.3	18.4	16.3
Percent with support primarily from the federal government		5.6	6.5	3.3	2.3
Number of postdoctorals	100	2,191	1,532	558	101
Percent with some direct U.S. support		64.1	70.6	55.2	15.8
Percent with support primarily from the federal government		15.0	18.3	8.4	1.0

Note: On this and subsequent tables, numbers of students and faculty are unrounded for convenience only and not to imply any greater degree of precision.

[a]The unduplicated total of participating institutions is 199.

Table 2

Estimated Number of Faculty with U.S. Support Engaged in Scientific and Technical Cooperative Activities with Developing Countries, 1977-78: All Ph.D.-Granting Institutions (N=288)

Faculty Activities	Number of Participating Institutions	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Total (unduplicated)	155	3,785	2,739	751	295
Teaching abroad	83	865	652	121	92
Collaborating in research	110	1,721	1,261	353	107
Consultation and other cooperation	107	1,199	826	277	96

Table 3

Estimates of Foreign Students and Postdoctorals from Developing Countries, 1977-78, by Selected Fields: Public Ph.D.-Granting Institutions (N=162)

Students and Postdoctorals	Number of Participating Institutions[a]	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Number of undergraduates (majors)	112	20,690	15,994	1,257	3,439
Percent with some direct U.S. support		11.2	10.9	12.8	11.9
Percent with support primarily from the federal government		1.8	1.7	2.8	1.8
Number of postbaccalaureates	113	24,564	20,152	1,117	3,295
Percent with some direct U.S. support		33.7	36.1	32.2	19.6
Percent with support primarily from the federal government		6.3	6.9	7.5	2.4
Number of postdoctorals	58	1,416	1,025	313	78
Percent with some direct U.S. support		67.3	71.9	65.8	12.8
Percent with support primarily from the federal government		16.0	18.0	13.1	1.3

[a]The unduplicated total of participating institutions is 117.

Table 4

Estimates of Foreign Students and Postdoctorals from Developing Countries, 1977-78, by Selected Fields: Private Ph.D.-Granting Institutions (N=126)

Students and Postdoctorals	Number of Participating Institutions[a]	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Number of undergraduates (majors)	72	13,480	8,722	1,737	3,021
Percent with some direct U.S. support		6.4	7.7	2.0	5.1
Percent with support primarily from the federal government		.2	.1	.1	.4
Number of postbaccalaureates	82	15,312	10,096	1,808	3,408
Percent with some direct U.S. support		28.2	36.6	9.8	13.1
Percent with support primarily from the federal government		4.3	5.8	.7	2.1
Number of postdoctorals	42	775	507	245	23
Percent with some direct U.S. support		58.3	67.9	41.6	26.1
Percent with support primarily from the federal government		13.2	18.9	2.4	0

[a]The unduplicated total of participating institutions is 82.

Table 5

Estimated Number of Faculty with U.S. Support Engaged in Scientific and Technical Cooperative Activities with Developing Countries, 1977-78: Public Ph.D.-Granting Institutions (N=162)

Faculty Activities	Number of Participating Institutions	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Total (unduplicated)	85	2,878	2,232	415	231
Teaching abroad	56	703	584	51	68
Collaborating in research	66	1,281	1,007	191	83
Consultation and other cooperation	65	894	641	173	80

Table 6

Estimated Number of Faculty with U.S. Support Engaged in Scientific and Technical Cooperative Activities with Developing Countries, 1977-78: Private Ph.D.-Granting Institutions (N=126)

Faculty Activities	Number of Participating Institutions	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Total (unduplicated)	70	907	507	336	64
Teaching abroad	27	162	68	70	24
Collaborating in research	44	440	254	162	24
Consultation and other cooperation	42	305	185	104	16

Table 7

Estimates of Foreign Students and Postdoctorals from Developing Countries, 1977-78, by Selected Fields: Large Ph.D.-Granting Institutions (N=144)

Students and Postdoctorals	Number of Participating Institutions[a]	Scientific, Technical, and Management Fields: Total	Science and Engineering	Health	Business and Management
Number of undergraduates (majors)	111	25,445	18,593	1,870	4,982
Percent with some direct U.S. support		9.5	10.1	5.8	8.8
Percent with support primarily from the federal government		1.4	1.5	.9	1.4
Number of postbaccalaureates	108	32,484	25,197	1,972	5,315
Percent with some direct U.S. support		29.8	33.5	20.7	16.1
Percent with support primarily from the federal government		4.5	5.1	4.4	2.0
Number of postdoctorals	58	1,543	1,114	332	97
Percent with some direct U.S. support		60.6	63.3	65.7	12.4
Percent with support primarily from the federal government		11.8	12.6	12.3	1.0

Note: "Large institutions" are institutions with total enrollments in 1976 greater than 9,455.

[a]The unduplicated total of participating institutions is 112.

Table 8

Estimates of Foreign Students and Postdoctorals from Developing Countries, 1977-78, by Selected Fields: Small Ph.D.-Granting Institutions (N=144)

Students and Postdoctorals	Number of Participating Institutions[a]	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Number of undergraduates (majors)	73	8,725	6,123	1,124	1,478
Percent with some direct U.S. support		8.7	9.0	7.7	8.3
Percent with support primarily from the federal government		.4	.1	1.9	.3
Number of postbaccalaureates	87	7,392	5,051	953	1,388
Percent with some direct U.S. support		39.4	50.4	13.6	17.1
Percent with support primarily from the federal government		10.2	13.8	1.0	3.3
Number of postdoctorals	42	648	418	226	4
Percent with some direct U.S. support		72.5	90.0	39.8	100.0
Percent with support primarily from the federal government		22.5	33.5	2.7	0

Note: "Small institutions" are institutions with total enrollments in 1976 less than 9,455.

[a]The unduplicated total of participating institutions is 87.

Table 9

Estimated Number of Faculty with U.S. Support Engaged in Scientific and Technical Cooperative Activities with Developing Countries, 1977-78: Large Ph.D.-Granting Institutions (N=144)

Faculty Activities	Number of Participating Institutions	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Total (unduplicated)	92	3,005	2,272	478	255
Teaching abroad	62	769	602	95	72
Collaborating in research	74	1,323	1,013	219	91
Consultation and other cooperation	70	913	657	164	92

Note: "Large institutions" are institutions with total enrollments in 1976 greater than 9,455.

Table 10

Estimated Number of Faculty with U.S. Support Engaged in Scientific and Technical Cooperative Activities with Developing Countries, 1977-78: Small Ph.D.-Granting Institutions (N=144)

Faculty Activities	Number of Participating Institutions	Scientific, Technical, and Management Fields			
		Total	Science and Engineering	Health	Business and Management
Total (unduplicated)	63	780	467	273	40
Teaching abroad	21	96	50	26	20
Collaborating in research	36	398	248	134	16
Consultation and other cooperation	37	286	169	113	4

Note: "Small institutions" are institutions with total enrollments in 1976 less than 9,455.

APPENDIX A: Survey Instrument

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

HIGHER EDUCATION PANEL
(202) 833-4757

December 30, 1977

Dear Higher Education Panel Representative:

Enclosed is the fortieth survey of the Higher Education Panel. This survey was requested by the National Science Foundation in cooperation with the Department of State. The information is expected to be used in the preparation of the United States Paper for the 1979 U.N. Conference on Science and Technology for Development.

This survey seeks to collect data on the number of nonimmigrant students from countries in the less developed world regions, and on U.S. faculty who teach and conduct research in those regions. In addition to its use for the U.N. Conference, this information should be helpful to persons in government and elsewhere who are involved in supporting university-based international science and technology activities and to faculty and others engaged in such programs.

Please allow me to make a few suggestions about completing this questionnaire: We have conducted a fairly intensive field test of this survey material, and results indicate that some of the requested information may not be readily available. In such circumstances the sponsors recommend that you obtain reasonable approximations from knowledgeable sources in your institution. Possible sources include directors or coordinators of international programs, the dean of foreign students, the academic vice-president, or the director of sponsored research. As the HEP representative, you are in the best position to determine the most appropriate respondent.

We would appreciate receiving the completed questionnaire by January 23, 1978. A return envelope is enclosed. If you have any questions or problems with this survey, please do not hesitate to call us collect at (202)833-4757. As you can see, it is especially important that you respond as soon as possible. If you cannot return the survey by January 23, please call to let us know.

This survey is authorized by the National Science Foundation Act of 1950, as amended. While you are not required to respond, your cooperation is needed to make the results comprehensive, reliable, and timely. As usual, please be assured that the information you provide will be held in strict confidence, will be reported in summary fashion only, and will not be identifiable with your institution. A copy of the printed report will be sent to you as soon as it becomes available.

Thank you again for your cooperation.

Sincerely,

Frank Atelsek

Frank Atelsek
Panel Director

P.S. Please note that we also have included a return postcard. We ask that you send it back to us now so we can be sure you have received the survey package.

American Council on Education
Higher Education Panel Survey No. 40

OMB #099-R0265
exp 6/78

Scientific and Technical Cooperation with
Developing Countries, 1977-78

Do not include immigrant students who are citizens or permanent residents of the US

Undergraduates (majors) should include students who can be identified as majoring in any of the specified fields.

US support encompasses any financial support (grant, loan, scholarship, employment) from the institution or other known US source.

(As you know, foreign students holding temporary visas are not eligible for aid under the five U.S.O.E. financial assistance programs.)

Consider only tuition and academic expenses in determing the source of primary support.

Postdoctorals include persons designated as postdoctoral or research associates with Ph.D's or M.D.'s (including foreign degrees) who devote full time to research or study under temporary appointments carrying no academic rank. They may contribute to the academic program. Their postdoctorals have an element of additional training for them.

Student Information	Total (From Developing Countries) (1)	By Selected Major Field: Science & Engineering (2)	Health Fields (3)	Business & Management (4)
I. Approximately how many foreign students and postdoctorals (on temporary visas only) enrolled at your institution during 1977-78, who come from developing countries and who are majoring in science and engineering, health fields, or business and management:		Developing countries and fields are defined fully on the back page.		
		Please note that data in column (1) equal the sum of data in columns (2), (3), and (4).		
A. Undergraduates (majors)				
1. Total (full- and part-time)	____	____	____	____
2. Number with support from a US source	____	____	____	____
(Of those reported in 2 above, number with US support primarily from the federal government)	(____)	(____)	(____)	(____)
B. Postbaccalaureate Students (excluding postdoctorals)				
1. Total (full- and part-time)	____	____	____	____
2. Number with support from a US source	____	____	____	____
(Of those reported in 2 above, number with US support primarily from the federal government)	(____)	(____)	(____)	(____)
C. Postdoctorals				
1. Total	____	____	____	____
2. Number with support from a US source	____	____	____	____
(Of those reported in 2 above, number with US support primarily from the federal government)	(____)	(____)	(____)	(____)

Please provide your best estimates if actual data are not available or cannot be provided before the requested return date.

Faculty Information	Total (All Developing Countries) (1)	By Selected Major Field: Science & Engineering (2)	Health Fields (3)	Business & Management (4)
II. During 1977-78, how many of your faculty are involved in cooperative activities with developing countries and are financed at least in part with US support:	Please note that data in column (1) equal the sum of data in columns (2), (3), and (4).			
A. Teaching abroad	_____	_____	_____	_____
B. Collaborating in research with researchers or faculty from any of these developing countries	_____	_____	_____	_____
C. Consultation and other cooperation (e.g., curriculum development, preparation of joint scientific papers)	_____	_____	_____	_____

Include only faculty who work in science and engineering, health fields, or business and management.

If a faculty member engages in two or more of these activities, please include him/her in which ever is the major activity.

Include faculty who are on sabbatical or other leave with some support from the institution or other US support such as government or foundations. Do not include those whose sole support is from a foreign government or other foreign source.

Thank you for your assistance.
Please return this form by January 23, 1978, to:

Higher Education Panel
American Council on Education
One Dupont Circle, N.W.
Washington, D.C. 20036

Please keep a copy of this survey for your records.

Person completing form

Name_____

Department_____ Phone_____

If you have any questions or problems, please call the HEP staff collect at 202-833-4757.

SELECTED MAJOR FIELDS:

Science and Engineering

Agriculture and natural resources: Include agriculture, forestry, food sciences and technology, natural resources management, and other related fields.

Behavioral and social sciences: Include psychology, political science or government, sociology, agricultural economics, area studies, anthropology, archeology, demography, economics, geography, linguistics and international relations. Do not include history, education, social work, public administration, or other applied fields.

Biological sciences: Include biology, botany, zoology, ecology, embryology, entomology, anatomy, biochemistry, biophysics, microbiology, pathology, pharmacology, physiology, and other related fields.

Engineering: Include aeronautical, architectural, biomedical, ceramic, chemical, civil, electrical, geological, industrial, mechanical, mining, nuclear, petroleum, and other engineering subfields.

Mathematical sciences: Include mathematics, statistics, computer sciences, data processing, systems analysis, and related fields.

Physical and environmental sciences: Include chemistry, earth sciences, physics, geology, meteorology, astronomy, metallurgy, geophysics, marine sciences, oceanography, and other physical and environmental sciences.

Health Fields

Include nursing, dentistry, medicine, optometry, osteopathic medicine, pharmacy, physical therapy, public health, podiatry, and veterinary medicine.

Business and Management

Include business management and administration, general business and commerce, accounting, banking and finance, business economics, business statistics, operations research, marketing and purchasing, transportation and public utilities, international business, and other business and management majors.

DEVELOPING COUNTRIES BY REGIONS OF THE WORLD (illustrative list):

Latin America and the Caribbean: Includes Central America, Mexico, South America, and the Caribbean.

Far East, excluding Japan: Includes China, Burma, Thailand, the Philippines, Malaysia, Indonesia, and others.

South Asia: Includes India, Afghanistan, Bangladesh, Pakistan, and Sri Lanka.

Black Africa (South of the Sahara): South Africa and Rhodesia should be excluded.

Near and Middle East and North Africa: Includes Turkey, Iran, Saudi Arabia, and other Middle East countries. Included in North Africa are Mauritania, Sahara, Morocco, Algeria, Tunisia, Libya, and Egypt.

APPENDIX B

Stratification Design for Weighting

Ph.D.-Granting Institutions

Cell	Characteristic, by Total Enrollment (1976)	Population (N=288)	Respondents (N=179)
1	Public university >9,455	95	76
2	Public university <9,455	17	10
3	Private university >9,455	31	22
4	Private university <9,455	42	30
5	Public four-year >9,455	17	14
6	Public four-year <9,455	33	19
7	Private four-year >9,455 [a]	1	0
8	Private four-year <9,455 [a]	53	8

[a] Cells 7 and 8 were collapsed for weighting because 52 private four-year colleges in the population, and all 8 of the respondents, had total enrollments less than 9,455.

APPENDIX C

Comparison of Respondents and Nonrespondents

Item	Respondents (N=179)	Nonrespondents (N=57)	Response Rate
Total	100.0	100.0	75.8
Control			
Public	66.5	52.6	79.9
Private	33.5	47.4	69.0
Type			
University	77.1	73.7	76.7
Four-year college	22.9	26.3	73.2
Census region			
Northeast	24.2	38.6	66.2*
Midwest	25.3	14.0	84.9*
South	32.6	29.8	77.3
West	18.0	17.5	76.2
Total enrollment (1976)			
Less than 1,000	2.8	8.8	50.0*
1,000 - 4,999	15.6	19.3	71.8
5,000 - 9,999	22.9	31.6	69.5
10,000 - 19,999	29.6	17.5	84.1*
20,000 or more	29.1	22.8	80.0

* Exceeds or falls short of overall response rate by more than 10 percent.

Of the 236 doctorate-granting institutions surveyed, 76 percent provided usable data by the deadline for returning questionnaires.

Responsents and nonrespondents did not differ greatly by type (about three-fourths of each being universities), but public institutions were more likely to respond than were private institutions (80 percent versus 69 percent).

Higher-than-average response rates were registered by institutions in the Midwest (85 percent) and by the larger colleges and universities (84 percent of the institutions enrolling between 10,000 and 20,000 students). Lower-than-average response rates were registered by institutions in the Northeast (66 percent) and by the smaller colleges (50 percent of the institutions enrolling fewer than 1,000 students).

Other Reports of the Higher Education Panel
American Council on Education

Blandford, B. and Dutton, D. **Survey of First-Year Graduate and Postdoctoral Enrollment in Science and Engineering.** Higher Education Panel Report, No. 1, August, 1971.

Blandford, B. and Dutton, D. **Research Support for Science Faculty.** Higher Education Panel Report, No. 2, November, 1971.

Astin, A., Blandford, B., and Mahn, T. **Freshman Class Vacancies in Fall 1971 and Recent Trends in Enrollment of Minority Freshmen.** Higher Education Panel Report, No. 3, February, 1972.

Changes in Graduate Programs in Science and Engineering 1970-72 and 1972-74. Science Resources Studies Highlights. Washington: National Science Foundation, July, 1972.

Blandford, B. and Sell, C. **Enrollment of Junior-Year Students (1970 and 1971).** Higher Education Panel Report, No. 5, April, 1972.

Trexler, J. and Blandford, B. **What College Presidents Are Reading.** Higher Education Panel Report, No. 6, March, 1972.

Trexler, J. and Kent, L. **Commercial Theme-Writing Services.** Higher Education Panel Report, No. 7, June, 1972.

Furniss, W. T. **Faculty Tenure and Contract Systems: Current Practice.** ACE Special Report, July, 1972.

Bayer, A. E. and Astin, A. W. **War Protest on U. S. Campuses During April 1972.** Higher Education Panel Report, No. 9, May, 1972.

Blandford, B. A. and Trexler, J. C. **Expected First-Year Graduate Enrollment in Science and Engineering, Fall 1972.** Higher Education Panel Report, No. 10, August, 1972.

Blandford, B. A. **Student Participation on Institutional Governing Boards.** Higher Education Panel Report, No. 11, October, 1972.

Dutton, J. E. and Blandford, B. A. **Enrollment of Junior-Year Students (1971 and 1972).** Higher Education Panel Report, No. 12, April, 1973.

Dutton, J. E. **Courses and Enrollment in Ethnic/Racial Studies.** Higher Education Panel Report, No. 14, August, 1973.

Dutton, J. E. and Jenkins, M. D. **The Urban Involvement of Colleges and Universities.** Higher Education Panel Report, No. 15, August, 1973.

Dutton, J. E. and El-Khawas, E. H. **Production of Doctorates in Selected Fields, 1972-1975.** Higher Education Panel Report, No. 16, April, 1974.

Dutton, J. E. **First-Year Enrollment for Masters or Higher Degrees, Fall 1973.** Higher Education Panel Report, No. 17, April, 1974.

El-Khawas, E. H. and Kinzer, J. L. **The Impact of Office of Education Student Assistance Programs, Fall 1973.** Higher Education Panel Report, No. 18, April, 1974.

El-Khawas, E. H. and Kinzer, J. L. **Enrollment of Minority Graduate Students at Ph.D. Granting Institutions.** Higher Education Panel Report, No. 19, August, 1974.

El-Khawas, E. H. **College and University Facilities: Expectations of Space and Maintenance Needs for Fall 1974.** Higher Education Panel Report, No. 20, September, 1974.

Kinzer, J. L. and El-Khawas, E. H. **Compensation Practices for Graduate Research Assistants: A Survey of Selected Doctoral Institutions.** Higher Education Panel Report, No. 21, October, 1974.

El-Khawas, E. H. and Furniss, W. T. **Faculty Tenure and Contract Systems: 1972 and 1974.** Higher Education Panel Report, No. 22, December, 1974.

El-Khawas, E. H. and Kinzer, J. L. **A Survey of Continuing Education Opportunities Available to Nonacademic Scientists, Engineers and Mathematicians,** Higher Education Panel Report, No. 23, April, 1975.

Atelsek, Frank J. and Gomberg, Irene L. **Bachelor's Degrees Awarded to Minority Students, 1973-74.** Higher Education Panel Report, No. 24, January, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Nonfederal Funding of Biomedical Research and Development: A Survey of Doctoral Institutions.** Higher Education Panel Report, No. 25, July, 1975.

Gomberg, Irene L. and Atelsek, Frank J. **Major Field Enrollment of Junior-Year Students, 1973 and 1974.** Higher Education Panel Report, No. 26, April, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Student Assistance: Participants and Programs, 1974-75.** Higher Education Panel Report, No. 27, July, 1975.

Atelsek, Frank J. and Gomberg, Irene L. **Health Research Facilities: A Survey of Doctorate-Granting Institutions.** Higher Education Panel Report, No. 28, February, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Faculty Research: Level of Activity and Choice of Area.** Higher Education Panel Report, No. 29, January, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Young Doctorate Faculty in Selected Science and Engineering Departments, 1975 to 1980.** Higher Education Panel Report, No. 30, August, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Energy Costs and Energy Conservation Programs in Colleges and Universities: 1972-73 and 1974-75.** Higher Education Panel Report, No. 31, April, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Foreign Area Research Support Within Organized Research Centers at Selected Universities, FY 1972 and 1976.** Higher Education Panel Report, No. 32, December, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **College and University Services for Older Adults.** Higher Education Panel Report, No. 33, February, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Production of Doctorates in the Biosciences, 1975-1980: An Experimental Forecast.** Higher Education Panel Report, No. 34, November 1977.

Gomberg, Irene L. and Atelsek, Frank J. **Composition of College and University Governing Boards.** Higher Education Panel Report, No. 35, August, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Estimated Number of Student Aid Recipients, 1976-77.** Higher Education Panel Report, No. 36, September, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **International Scientific Activities at Selected Institutions, 1975-76 and 1976-77,** Higher Education Panel Report, No. 37, January, 1978.

Atelsek, Frank J. and Gomberg, Irene L. **New Full-Time Faculty 1976-77: Hiring Patterns by Field and Educational Attainment,** Higher Education Panel Report, No. 38, March 1978.

Single copies of the above reports may be obtained from the Higher Education Panel, American Council on Education, One Dupont Circle, Washington, D. C. 20036.